Missouri Adult Blood Lead Surveillance and Epidemiology Program Annual Report

January 1 through December 31, 2003

The Centers for Disease Control and Prevention (CDC), National Institute of Occupational Safety and Health (NIOSH) has funded states to operate the Adult Blood Lead Surveillance and Epidemiology (ABLES) program since 1987. The goal of this program is the elimination of all cases of workplace-induced lead elevations ≥25 μg/dl (micrograms per deciliter) in adults by the year 2010. In 2003, 32 states were funded to collect and analyze data on cases of elevated blood lead levels in individuals age 16 years and older. The majority of lead elevations in this population are believed to be due to exposures in the workplace. Non-identifying data is reported to NIOSH by state ABLES programs for national surveillance purposes.

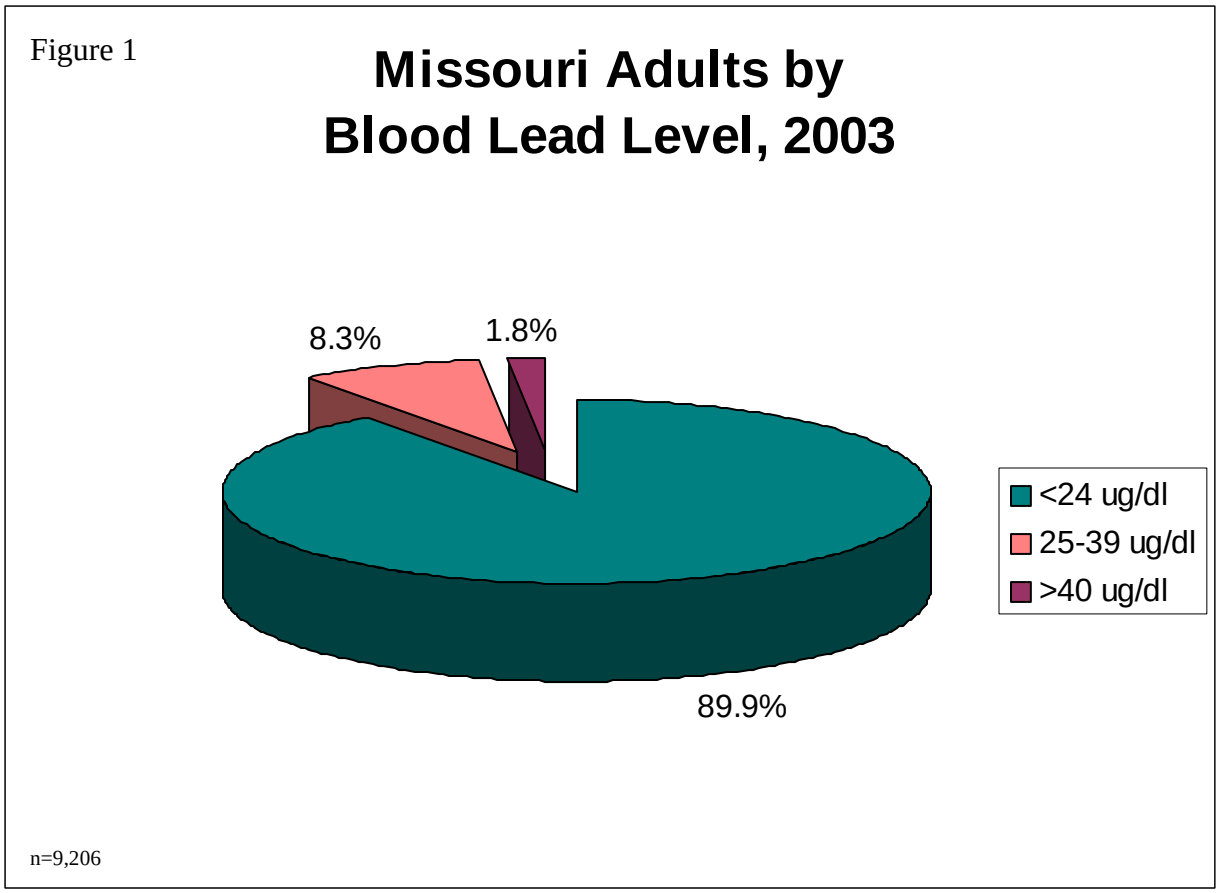
All blood lead testing of Missouri residents is reportable to the Missouri Department of Health and Senior Services under the Missouri Code of State Regulations 19 CSR 20-20.20 and 19 CSR 20-20.80, regardless of age of the patient or blood lead level. The department's Office of Surveillance administers the Missouri ABLES (MO ABLES) program, which was first funded by NIOSH in Fall 2001. This report summarizes blood lead testing and elevated lead levels in Missouri residents age 16 years and older for calendar year 2003.

There were 15,195 blood specimens drawn, analyzed, and reported to the MO ABLES program for Missouri residents age 16 years and older for the period January 1 through December 31, 2003. Blood specimens drawn but not analyzed are excluded. The range of reported blood lead levels was from zero or non-detectable to a high of 160 μg/dl. The majority of specimens analyzed, 12,447 (81.9%) were <25 μg/dl.

Analysis of the Missouri ABLES 2003 data revealed 2,321 adults were tested more than once, for a total of 9,206 unduplicated individuals being tested in 2003. Of these, 8,274 (89.9%) had lead levels <25 μg/dl. There were 766 (8.3%) reported with lead levels between 25 μg/dl and 39 μg/dl, and 166 (1.8%) whose highest level was 40 μg/dl or above. For statistical purposes, blood lead level determination for Missourians tested more than once during the timeframe is based upon their highest reported blood lead level.

In total during 2003, 932 (10.1%) of all individuals tested had at least one blood lead test at or above 25 μg/dl, the lead level of concern for non-pregnant adults. See Figure 1. The highest level acceptable for workers by U.S. Occupational Safety and Health Administration (OSHA) standards is 40 μg/dl.

Figure 1



The MO ABLES program data is primarily collected through reporting by laboratories analyzing blood lead specimens under 19 CSR 20-20.080, the Missouri disease reporting rule. This rule requires laboratories to report to the state or local health authority all blood lead test results for Missouri residents. Information is to include patient date of birth or age, home address, gender, race, ethnicity, date of blood lead test, and laboratory results. Despite this regulation, laboratory data often does not include all information needed by the MO ABLES program. Missing information on individuals with blood lead levels ≥25 μg/dl is sought by contacting medical providers and employers; therefore, data on non-elevated adults is more likely to be incomplete in the MO ABLES database.

The following data analyses were performed on the data set consisting only of the 932 individuals with at least one blood lead level ≥25 μg/dl during calendar year 2003.

Of the 932 elevated adults tested in 2003, the MO ABLES program had date of birth or age information for 782 (83.9%). Of individuals with a known age, there were 775 (99.1%) between 18 and 64 years of age at the time their blood specimen was drawn. During this time frame, there were 7 (0.8%) adults 65 years or older but no 16 or 17 year-olds with an elevated blood lead level. Age was not known for 150 (16.1%) of

individuals with lead levels ≥25 μg/dl (Figure 2). Date of birth and/or age on incomplete records will continue to be sought and added to the database when received.

Figure 2

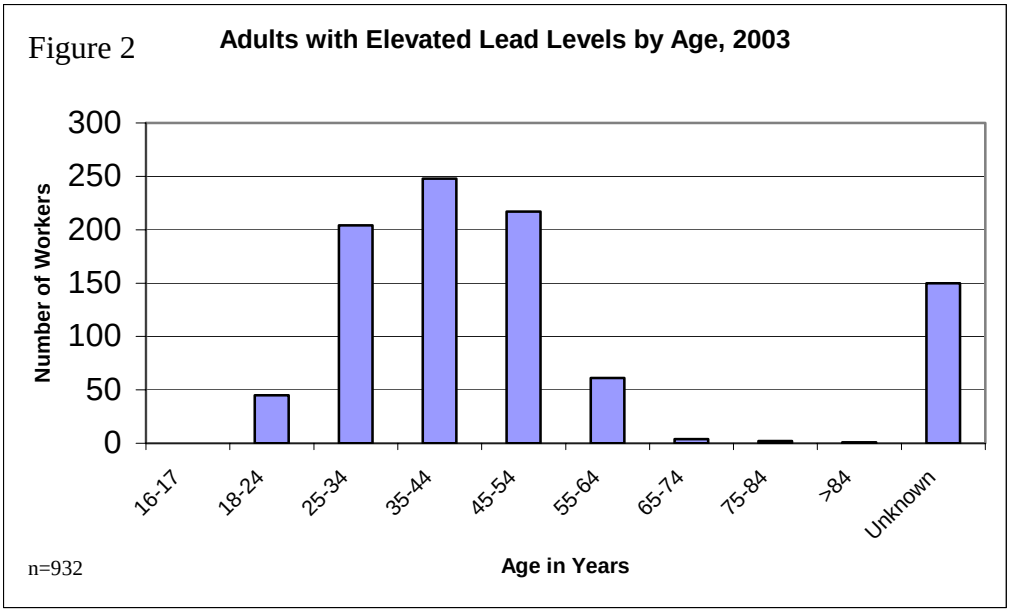
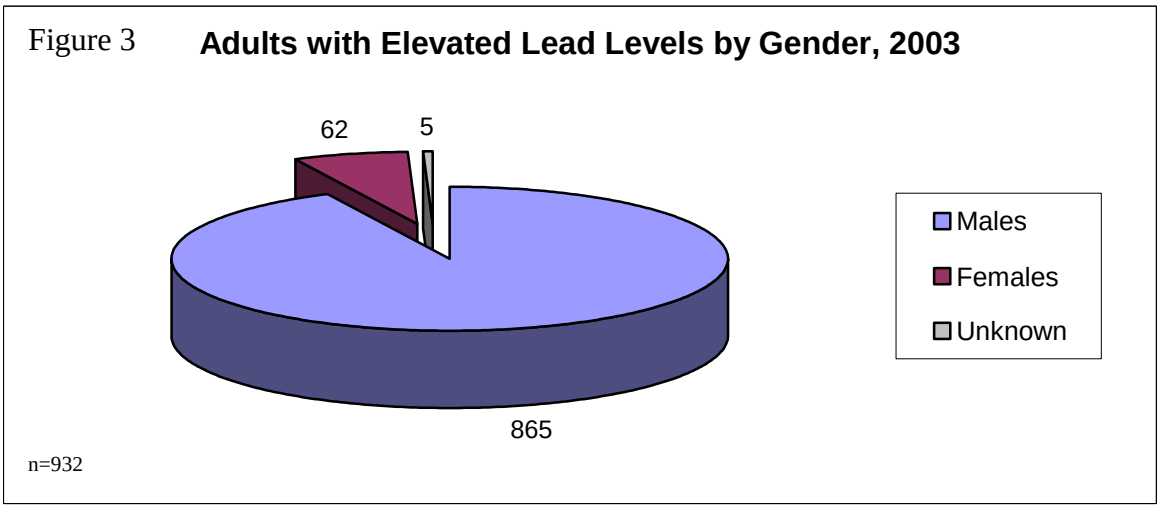


Figure 3 illustrates that 865 (92.8%) adults with elevated lead levels were male, females comprised 62 (6.7%), and 5 (0.5%) were unknown gender.

Figure 3



Race and ethnicity information is sought for all adults with elevated lead levels. When contacted, MO ABLES staff find that many medical providers and employers do not have this information available about their patients and workers. For the 371 individuals with a reported race, 357 (96.2%) were white, 11 (3.0%) were black, and 3 (0.8%) were Native American or Alaskan Native. None were reported as Asian or Pacific Islander. Of 367 elevated adults with a reported ethnicity, 361 (98.4%) were Non-Hispanic and 6 (1.6%) were Hispanic. However, as indicated in Figures 4 and 5, race and ethnicity are not known for the majority of adults with elevated lead levels.

Figure 4

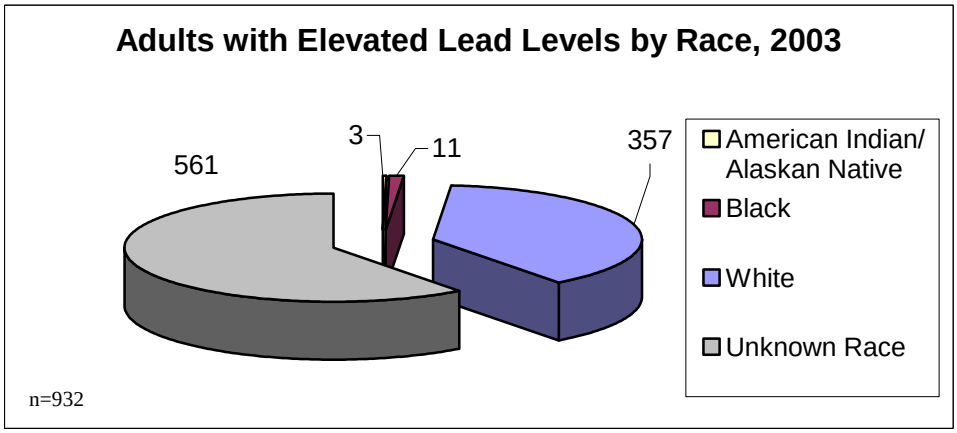
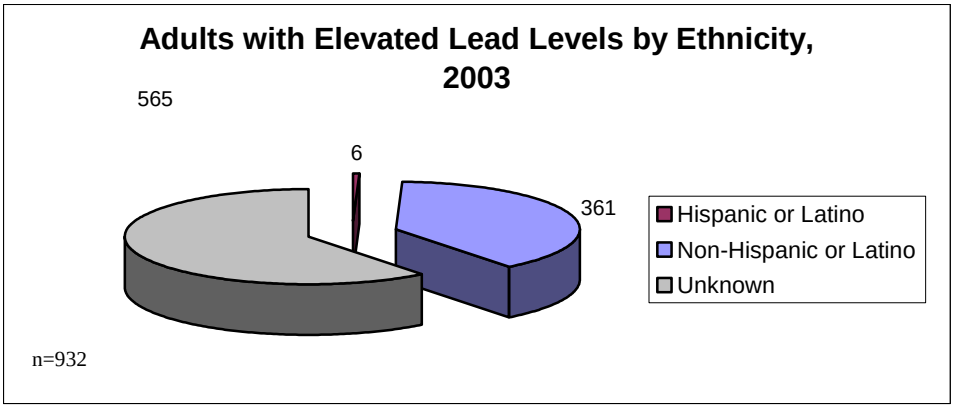


Figure 5



Of the 932 individual records with blood lead levels ≥25 μg/dl drawn in 2003, 880 (94.4%) have a known employer and Standardized Industry Code (SIC). Eight industries represented 827 (94.0%) of the workers whose records had a SIC code. The industries with the largest numbers of lead-elevated employees are shown in Figures 6 and 7. A worker's place of employment is assumed to be their source of exposure unless other source information, such as an exposure by hobby, is received.

Lead battery manufacturing, mining, smelting, and other related industries are an important part of Missouri's economic base. Some of the world's largest known lead deposits are located in Missouri, and mining has been ongoing since the 1700s. While lead is a great economic resource, lead in the human body is a health hazard. Missouri's largest lead industries provide community education and services, and they test their employees according to OSHA requirements. These companies also cooperate in providing demographic information to aid the MO ABLES program in data collection.

Figure 6

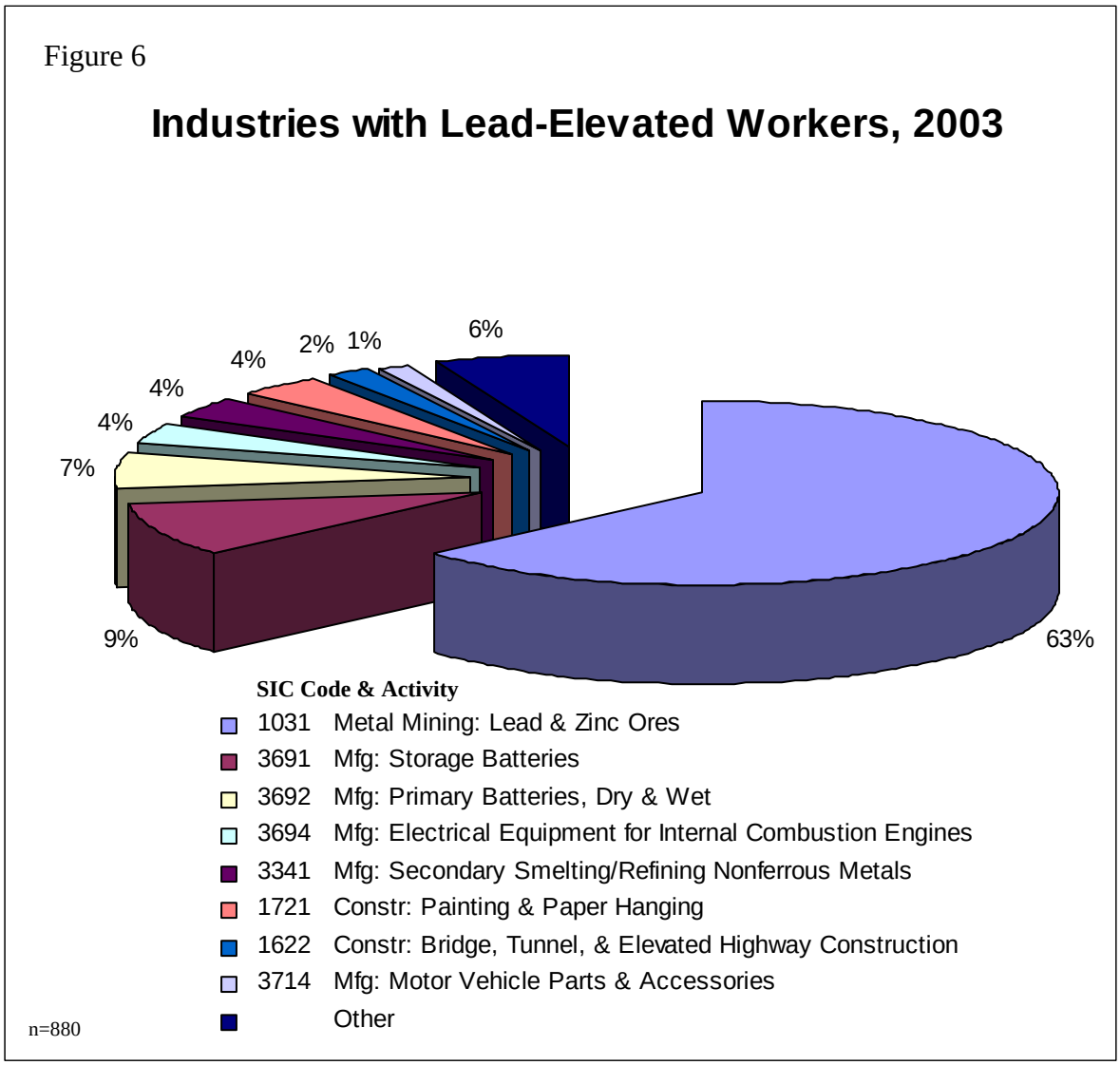


Figure 7

Lead-Elevated Workers by Industry, 2003

SIC Division	*Standard Industry Code (SIC)*	*SIC Activity*	*# Workers Elevated >25 ug/dl*
Metal Mining	1031	Lead & Zinc Ores	561
Manufacturing	3691	Storage Batteries	81
Manufacturing	3692	Primary Batteries, Dry & Wet	58
Manufacturing	3694	Electrical Equipment for Internal Combustion Engines	32
Manufacturing	3341	Secondary Smelting & Refining of Nonferrous Metals	31
Construction	1721	Painting & Paper Hanging	35
Construction	1622	Bridge, Tunnel, & Elevated Highway Construction	17
Manufacturing	3714	Motor Vehicle Parts & Accessories	12
Various	Various	All other Standard Industry Codes combined	53
Total			880

There were 23 records for elevated adults without an identifiable employer or SIC code, but for whom an occupation or other source was known. These sources included repairing radiators (2), non-specific construction/demolition (2), painting (3), using firearms (9) and removing lead-based paint (7). The two Missourians with the highest blood lead levels in 2003, 109 μg/dl and 160 μg/dl, were workers sandblasting lead-based paint in an enclosed area. Employment or source information on 29 individuals was not available, including four suspected false positive or mis-reported lead levels, and three persons for whom their physician could not determine the cause of the lead elevation.

The MO ABLES database includes 772 (82.8%) records with a known county of employment for the 932 individuals with a blood lead elevation in calendar year 2003. Workers who are employed out of state are included in the MO ABLES data if they are known to reside in Missouri. Of the 772 lead-elevated workers with a known address of employment, 80 (10.4%) individuals were working in another state. There were 67 (8.7%) Missouri residents with elevated blood lead levels who were employed in Kansas, 7 (0.9%) in Iowa, 2 (0.3%) each in Illinois and Oklahoma, and 1 (0.1%) each in Alabama and Wisconsin (Appendix A, Map 1).

As shown by Map 2 in Appendix A, many workers commute across county boundaries to reach their places of employment. Analysis of this trend is impaired because reported information often does not include a worker's home address to compare with employment address data. Of the 772 elevated workers for 2003 with a known county of employment, 666 (86.3%) included a county of residence. While workers with known lead elevations live in 57 of Missouri's 115 counties, their places of employment are concentrated in only 24 counties, 7 of which are out-of-state. Of the 932 workers with elevated blood lead levels in 2003, 575 (61.7%) are both employed and live in the state of Missouri.

Rates of adult blood lead elevations were calculated using MO ABLES data and Office of Social and Economic Data Analysis (OSEDA) employment status data. Dent County had the highest rate with over 3,028 elevations per 100,000 workers. Holt and Iron counties had the next highest rates of elevations 1,180.2 and 784.4 respectively (Figure 8).

Figure 8

Number and Rate of Workers with Blood Lead Elevations by County of Employment, Missouri 2003

County of Employment	*# Workers Elevated ≥25 ug/dl*	*Rate of Elevated Workers per 100,000*
Dent	199	3028.5
Holt	30	1180.2
Iron	35	784.4
Jefferson	216	206.5
Johnson	44	189.3
Clinton	17	178.7
Lafayette	26	156.6
Buchanan	65	156.6
New Madrid	10	115.5
Nodaway	8	68.1
Cole	4	10.7
Henry	1	9.6
Cape Girardeau	3	8.2
St. Louis City	7	4.3
St. Louis	18	3.4
Jackson	8	2.4
Clay	1	1.0
Total	692	

There were 17 Missouri counties (including St. Louis City) where workers with a blood lead elevation ≥25 μg/dl were employed in 2003 (Appendix A, Map 3). Metal mining (SIC 1031), which is the industry employing 561 lead-elevated workers in 2003 (Figure 7), is conducted in Dent, Iron and Jefferson counties. Jefferson County also had workers with lead elevations employed in the painting and paper hanging industry (SIC 1721). Secondary smelting and refining of Nonferrous Metals (SIC 3341) occurs in Holt County, where there were 30 workers with lead elevations.